

Quantifying the Spatial Coherence of Deficit and Excess Rainfall across the Continental United States

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Historical Observations: Simultaneous Extreme Events

Year 1998

Seven Die in Kansas City Floods

CRAIG HORST October 6, 1998

The Halloween Flood of '98

by Janet Spurgeon
Service Hydrologist, WFO Wichita



Photo courtesy of Butler County Times Gazette

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Drought in Texas and Oklahoma Stunting Crops and Economies

Severity Is Reminiscent of the Dust Bowl Years

By RICK LYMAN

HOUSTON, Aug. 11 — Figuring out how far Lynn Bartlett's error-set grid of sprinklers can reach as they pivot around his sun-cracked cotton fields along the Salt Fork of the Red River is really not much of a chore. "The plants within the irrigation perimeter stand three or four feet high, thick and bristling with moist green bolls of healthy cotton, some of them as big as an apricot. Just beyond the water's reach, though, the plants stand only a foot above the scaly soil and must have just two or three dusty bolls, none bigger than a Ping-Pong ball.

"This is basically burn-up cotton," Mr. Bartlett said. "We had a good planting rain back in May, then a week or so later the tap just shut off and it's been off ever since."

While many parts of the country, including the Northeast, are suffering through dry months verging on drought, the situation is particularly severe in Texas and Oklahoma. Just two years after a drought ravaged large swaths of the rich agricultural region, both states are in the midst of a dry spell that officials say shows signs of developing into the costliest and most devastating the region has seen since the Dust Bowl years.

There is not a corner of Texas that is not laboring under severe or extreme drought conditions. President Clinton has declared each of the state's 354 counties a Federal disaster area, making farmers eligible for low-interest loans. "The crops have been hit, the livestock has been hit, and there's really no relief in sight," said the Texas Agriculture Commissioner, Rick Perry. "I am starting to hear reports that this is the worst ever."

During crucial growing weeks from April through June, Texas received little measurable rainfall at all. South Texas, which has been hit hardest by the drought, received only 8 percent of its normal precipitation; the citrus ranchlands of the Rio Grande Valley only 4 percent.

Oklahoma received only two-thirds of its normal rainfall from June 1 to Aug. 1, and the southwestern corner of the state received less than a third. Adding to the problems is the extreme heat throughout the region this summer, taking away the last bits of moisture in already dry fields.

The United States Agriculture Secretary, Dan Glickson, recently declared 66 of Oklahoma's 77 counties Federal disaster areas, and state officials are hearing the same sort of dire reports about the drought's effects.

"All of agribusiness is very much affected," said Oklahoma's Agriculture Commissioner, Dennis Steward. "The \$2 dollar gone around Main Street six, seven, eight times, but it's going around now, because it's not there. Small-town Oklahoma is really hurting."

But Texas and Oklahoma have changed a great deal since the Dust Bowl years of the 1930s, growing more urban and more economically diverse, particularly in the last two decades. So even though the drought could have a serious effect on farmers, cattle ranchers, small towns and agriculture-related businesses, the region's overall economy could well be cushioned.

On Wednesday in Washington, the Agriculture Department will release its monthly crop report, estimating

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Judge Punishes Arkansas Boys Who Killed 5

By RICK BRAGG

JONESBORO, Ark., Aug. 11 — Just before a judge remanded 14-year-old Mitchell Johnson and 12-year-old Andy County Courthouse yesterday for trial in the fatal shootings of

British Pet Amoco in

By N

LONDON, Aug. 11 — British Petroleum (B.P.) announced today would acquire the American Amoco for \$44.2 billion in one of the largest oil industry mergers.

The deal would also be the takeover of an American company by a foreign concern.

If approved by regulators, shareholders of both companies, as the company names, would be the world

Are spatiotemporal frequency of simultaneous hydrologic deficits and excesses related to the variability in large-scale climate and atmospheric features?

U.S.

Drought-Stricken South Facing Tough Choices

By BRENDA GOODMAN OCT. 16, 2007



Worst-case analyses indicate that Lake Lanier, the main water source for Atlanta, could be drained dry within four months. Pouya Dianat/The Atlanta Journal-Constitution

President Declares Major Disaster For

Release date: September 25, 2007

Release Number: HQ-07-198

WASHINGTON, D.C. -- The head of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) today announced that federal disaster aid has been made available for the state of Illinois to help people and communities recover from the effects of severe storms and flooding during the period of August 20-31, 2007.

ATLANTA, Oct. 15 — For the first time in more than 100 years, much of the Southeast has reached the most severe category of drought, climatologists said Monday, creating an emergency so serious that some cities are just

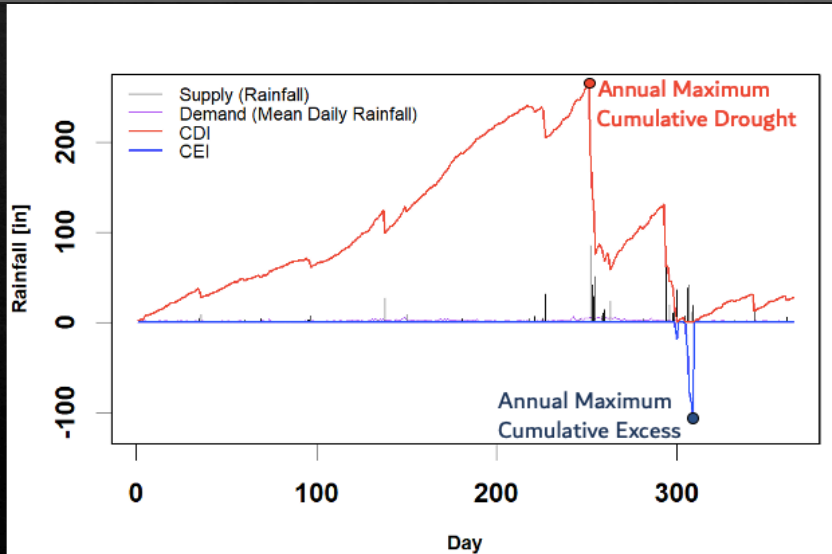
Death Toll Climbs in Flood-Stricken Midwest

By LIBBY SANDER AUG. 24, 2007



Year 2007

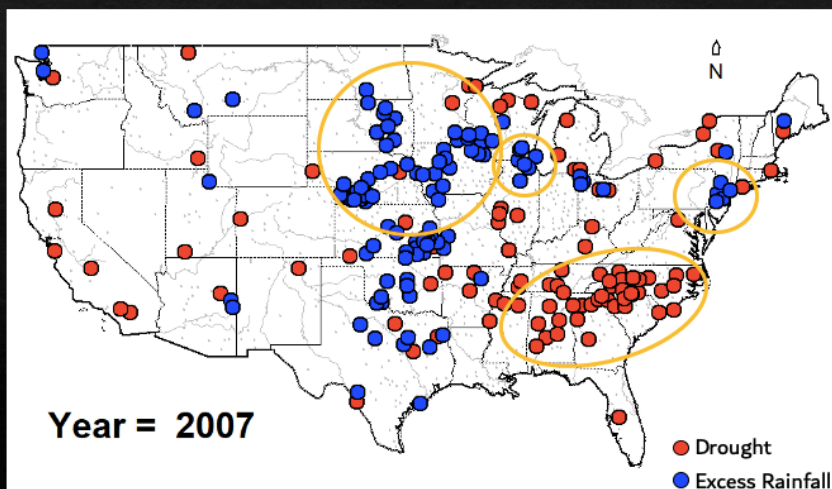
Results: Climate Impact Assessment



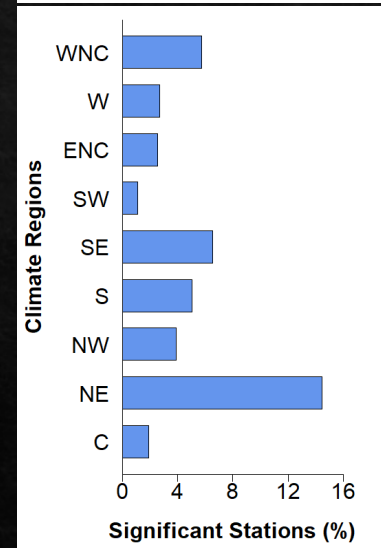
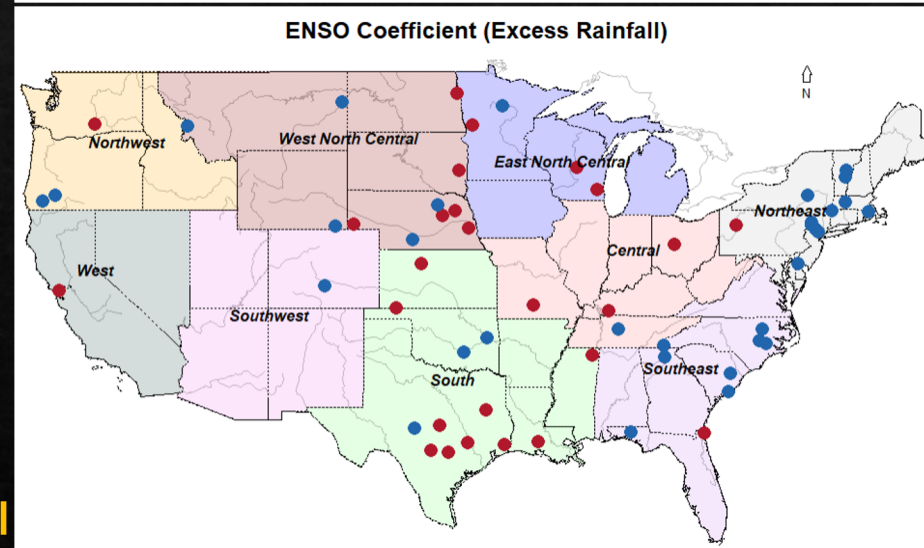
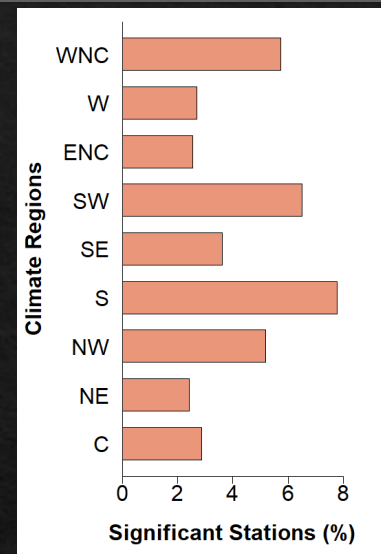
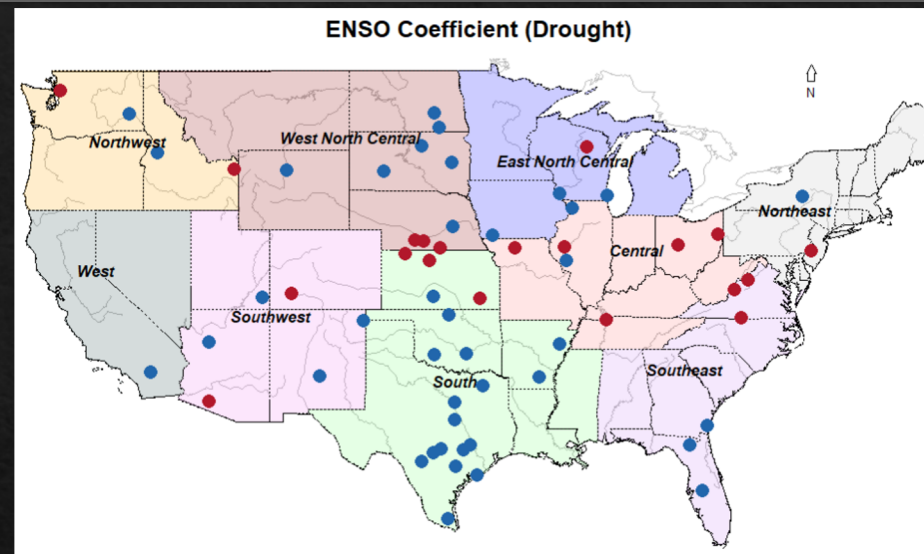
Robust Principle
 Component Analysis
 (rPCA)

$$\text{Minimize } \|L\|_* + \lambda \|S\|_1$$

subject to $M = L + S$



Climate Model



$$S[i, t] \sim \text{Bin}(\text{Pr}[i, t])$$

$$\text{logit}(\text{Pr}[i, t]) = \alpha[i] + \beta[i] * \text{ENSO}[t] \quad (i: \text{Stations}, t: \text{Years})$$

Summary

- We quantify and detect simultaneous extremes in floods and droughts using robust PCA technique (ML algorithm)
- Separation of joint outliers better facilitates their modeling with large-scale teleconnection indices
- Significant number of stations in the **Northeast USA** are associated with ENSO for the prediction of *annual excess rainfall*
- Significant number of stations in the **Southern USA** are associated with ENSO for the prediction of *annual deficits in rainfall*
- The timing of these extremes can be related to regional-scale atmospheric controls
- A complete prediction model is now being explored which includes multi-scale climate variables